



# Intel® Embedded Compact Extended Form Factor

## Overview

The small-form factor single board computer (SBC) has become increasingly important in the embedded environment. While embedded developers must confront space and thermal constraints, many embedded systems require features and performance comparable with desktop platforms. Intel® Embedded Compact Extended Form Factor (Intel® ECX Form Factor) is an open specification that combines aggressive real estate management, the performance of Intel® Architecture embedded processors, and support for multiple interfaces.



## Challenges

The Intel ECX Form Factor helps meet the application requirements of in-car “infotainment” systems, medical equipment, and interactive client devices, including point-of-sale terminals and kiosks.

- Car infotainment systems must be small enough to fit within the space-constrained environment of the vehicle without compromising features including multimedia capability, Internet connectivity, and the ability to handle GPS navigation and communications applications.
- Medical equipment requires thermally efficient fanless designs capable of operating in quiet environments while delivering uncompromising stability.
- Interactive client and kiosk systems need to support high-resolution graphical interfaces and dual independent display systems.

## Intel® ECX Form Factor–based solutions

Its relatively small size and compact I/O interfaces enable an Intel ECX Form Factor board to fit into a standard DIN slot for use in vehicle systems, medical imaging systems, interactive kiosks, and industrial panel PCs for industrial use, in addition to entertainment, gaming, and other computationally intensive embedded applications.

Intel ECX Form Factor enables a 75 percent space reduction compared to a micro-ATX board. In addition to benefiting from the low power characteristics of the Intel® Pentium® M processor, fanless thermal solutions for the Intel ECX Form Factor help to eliminate noise and reliability issues related to the use of fans and heat sinks.

## Scalable performance and flexible expansion

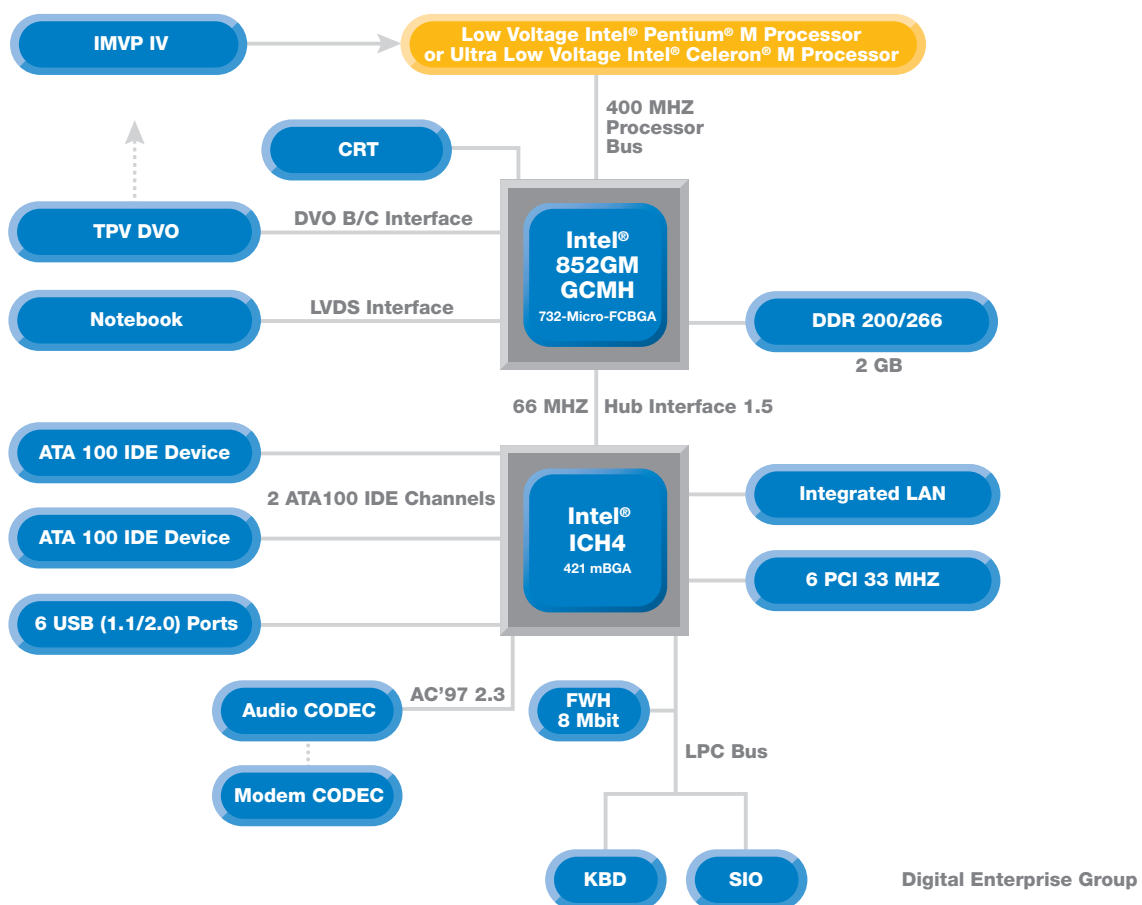
The Intel ECX Form Factor board measures 105 mmx146 mm and provides rich generic I/O connections and interfaces. The board is divided into three regions. Region A is dedicated to core platform components including Intel Architecture embedded processors, chipsets, firmware hubs, and LAN controllers. Region B is principally dedicated to I/O connector interfaces. Region C is an open region reserved for expansion pin-out and components. This organization provides the flexibility needed to implement custom embedded designs.

For example, in a car infotainment application, a variety of available GPS modules can fit onto the board's I/O interface area, based on the COMM interface or USB. Wireless network access can be enabled on the expansion region.

## Proof of concept (PoC) designs

To help customers accelerate their development cycles, Intel has developed proof of concept (PoC) designs that include optimized schematics, board stack-up layers, and PCB layouts. These designs can help developers evaluate Intel® embedded processors and chipsets in Intel ECX Form Factor solutions for a broad range of application segments.

## Intel® 852GM chipset-based platform



**Figure 1—This Intel® ECX Form Factor proof of concept design is based on the Intel® Pentium® M processors for embedded computing on 0.13µ process technology, paired with the Intel® 852GM chipset. It provides a reference platform for developers of embedded applications.**

## Intel® 915GM Express chipset-based platform

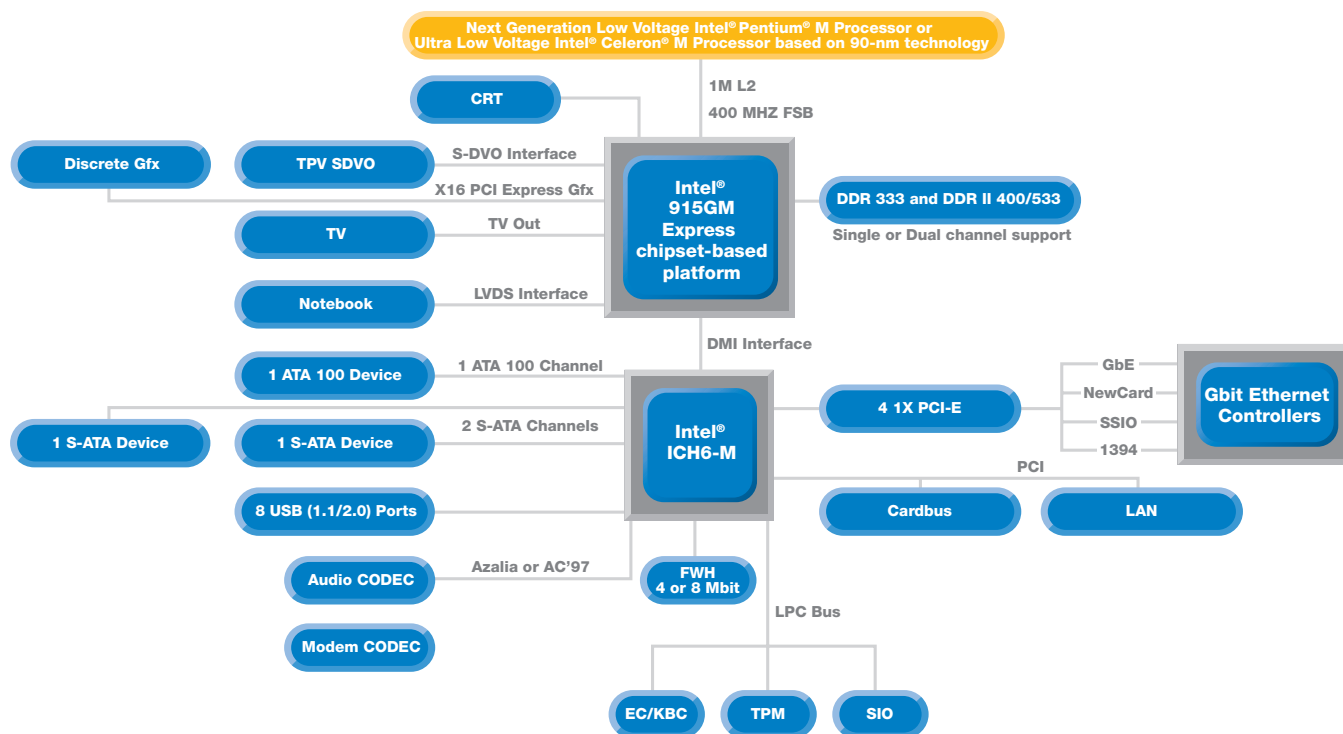


Figure 2—This Intel® ECX Form Factor proof of concept platform is based on Intel® Pentium® M processors for embedded computing on 90-nm process technology, validated with the Intel® 915GM Express chipset-based platform.

## Intel® ECX Form Factor features and benefits

| Feature  | Benefit  |
|--|--|
| Extremely small baseboard geometry: 105 mm x 146 mm  | Compact size fits confined-space applications and helps reduce material and assembly costs   |
| Dedicated functional blocks (A, B, and C)  | Ensures the compatibility of the system design and increases the reusable flexibility when upgraded to new platform                                      |
| A: Core platform component region supports Intel® Pentium® M processors and validated chipsets | Low power and high performance processors provide scalability and flexibility to handle demanding embedded applications in fan-based and fanless designs |
| B: Compact I/O region  | Rear panel region defined to accommodate basic I/O interfaces  |
| C: Defined expansion region  | Multiple I/O signals can be defined to flexibly address a broad range of expansion requirements  |

### More information

For more information, consult the specification *Intel Embedded Compact Extended Form Factor Single Board Computer Interface* available at <http://www.intel.com/design/intarch/papers/index.htm> or refer to the Web site <http://developer.intel.com/technology/ecsff/app.htm>.



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